CLAIMS

What is claimed as the invention is:

1. A device for applying a known resistance force and measuring an internal angle of gyration of a mold in a gyratory compactor, the device comprising:

a body configured to fit within a mold suitable for use in a gyratory compactor, the body having a first end and a second end and a side wall which extends between the first and second ends, the first and second ends extending laterally beyond the side wall;

a protrusion which extends from the first end, and a protrusion which extends from the second end, each protrusion configured to provide a contact with a mold end plate, the body providing resistance to a force applied to the body by contact with one of the protrusions;

an assembly within the body for measuring an internal angle of gyration, the assembly including:

a guide block,

guide block probes in the guide block which extend outward from the side wall of the body,

a guide rod for holding a reference probe to extend through one of the first or second ends of the body,

a slide block attached to the guide rod, and

a linear sensor probe mounted to the slide block to extend through one of the first or second ends of the body.

2. The device of claim 1 wherein surfaces of the first and second ends of the body are planar, and the protrusions are removably attached to the planar surfaces.

3. The device of claim 1 wherein the guide block is pivotally mounted within the body.

4. The device of claim 1 further comprising circuitry for receiving and processing signal

inputs from the guide block probes, reference probe and linear sensor probe and outputting internal gyration angle data.

5. The device of claim 4 further comprising a display for displaying internal gyration angle data.

6. The device of claim 4 further comprising data transfer equipment for transferring internal gyration angle data from the device.

7. The device of claim 1 wherein the guide rod is mounted in linear bearings in the guide block.

8. The device of claim 1 wherein the guide block is spring biased toward a wall of the body.

9. The device of claim 1 wherein the linear sensor probe is spring biased toward an end of the body.

10. A device for applying a known resistance force and measuring an internal angle of gyration of a mold in a gyratory compactor, the device comprising:

a body configured to fit within a mold suitable for use in a gyratory compactor, the body having a first end and a second end and a side wall which extends between the first and second ends, the first and second ends extending laterally beyond the side wall;

a protrusion which extends from the first end, and a protrusion which extends from the second end, each protrusion configured to provide a contact with a mold end plate, the body providing resistance to a force applied to the body by contact with one of the protrusions;

an assembly within the body for measuring an internal angle of gyration, the assembly including:

a guide block,

guide block probes in the guide block which extend through at least one of the ends of the body,

a guide rod for holding a reference probe to extend through the wall of the body,

a slide block attached to the guide rod, and

a linear sensor probe mounted to the slide block to extend through the wall of the body.

11. A system for applying a load and measuring an internal angle of gyration in a mold adapted for use in a gyratory compactor, the mold having a wall and mold plates which fit within the mold wall, the system comprising:

an internal gyration angle measurement device which fits within the mold wall and in planar contact with a first mold plate, the internal angle measurement device having at least one probe which contacts the mold wall;

a second mold plate in planar contact with the internal gyration angle measurement device on a side of the internal gyration angle measurement device opposite to the first mold plate, and

a loading device within the mold and in contact with the second mold plate.

12. The system of claim 11 wherein the loading device contacts the second mold plate at one point, and contacts a third mold plate opposite to the second mold plate at one point.

13. The system of claim 11 wherein the first mold plate is positioned at or near a bottom of the mold, the second mold plate is positioned between the internal gyration angle measurement device and the loading device.

14. The system of claim 11 wherein the loading device is positioned above the internal gyration angle measurement device within the mold.

15. The system of claim 11 wherein the internal gyration angle measurement device is positioned above the loading device within the mold.

16. The system of claim 11 wherein the loading device is in single point contact with two mold plates in the mold, and the internal gyration angle measurement device is in planar contact

with a mold plate.

17. A system for applying a load and measuring an internal angle of gyration in a mold used in a gyratory compactor, the system comprising:

an internal gyration angle measurement device which fits within the mold and which contacts a wall of the mold;

a loading device which fits within the mold, the loading device having a first protrusion which contacts the internal gyration angle measurement device.

18. The system of claim 17 wherein the loading device is positioned on top of the internal gyration angle measurement device within the mold.

19. The system of claim 17 wherein the loading device is positioned underneath the internal gyration angle measurement device within the mold.

20. The system of claim 17 wherein the loading device has a second protrusion which is contacted by a compaction ram which is inserted into the mold.

21. The system of claim 17 wherein the loading device has a second protrusion which contacts a mold plate within the mold.

22. The system of claim 17 wherein the internal gyration angle measurement device is contacted by a compaction ram which is inserted into the mold.

23. A system for measuring an internal gyration angle in a gyratory compactor which is instrumented to sense positions of a mold in the gyratory compactor and to sense positions of mold plates within the mold, a loading device positioned in the mold between mold plates, the loading device having a body with a protrusion on opposite sides of the body, each protrusion in contact with one of the mold plates.

24. The system of claim 23 wherein a compaction ram of the gyratory compactor is in contact with one of the mold plates to apply a force as the mold is gyrated within the gyratory compactor.

25. The system of claim 23 comprising position sensors operative to sense positions of a first mold plate on a first side of the loading device and positions of a second mold plate on a second side of the loading device, and to sense positions of the mold as it is gyrated.

26. A method of measuring an internal gyration angle in a mold in a gyratory compactor, the method comprising the steps of:

positioning an internal gyration angle measurement device in a mold between two mold plates, the internal gyration angle measurement device having a body with planar ends which are positioned in planar contact with the mold plates;

positioning a loading device in the mold in contact with one of the two mold plates in contact with the internal gyration angle measurement device;

applying a force to the loading device as the mold is gyrated in a gyratory compactor, and

obtaining a measurement of an internal gyration angle from the internal gyration angle measurement device measured while the force is applied to the loading device and while the mold is gyrated.